Subterranean Biology 28: 53–66 (2018)
doi: 10.3897/subtbiol.28.32093
http://subtbiol.pensoft.net

IN MEMORIAM

A peer-reviewed open-access journal
Subterranean Biology
Published by The International Society for Subterranean Biology

In Memoriam – John R. Holsinger

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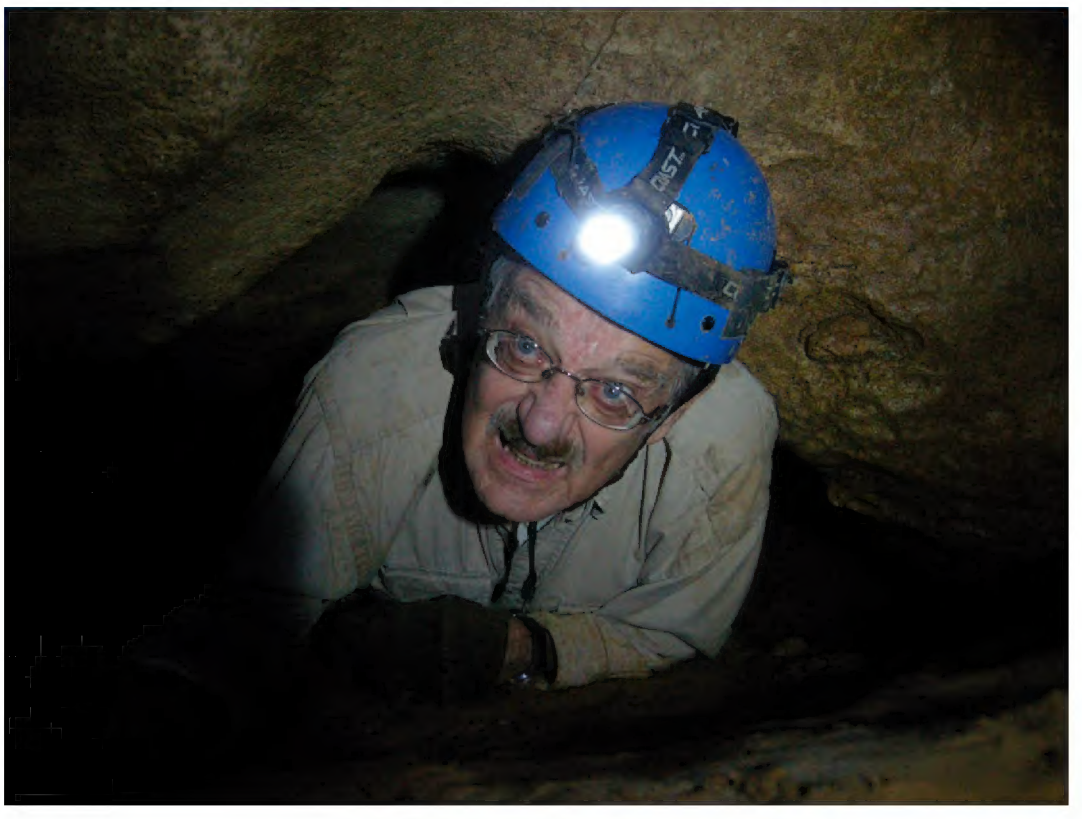
Received 1 December 2018 | Accepted 2 December 2018 | Published 12 December 2018

http://zoobank.org/3E89770E-C6C7-4941-9132-5C037A3C5F5E

Citation: Culver DC (2018) In Memoriam – John R. Holsinger. Subterranean Biology 28: 53–66. https://doi.org/10.3897/subtbiol.28.32093



John R. Holsinger, a prominent biospeleologist, both on the national and international scene, died on November 10, 2018. John's caving career spanned nearly 70 years, and his career as a biospeleologist and amphipod systematist spanned more than 50 years. Overall, John wrote more than 135 scientific papers and monographs (listed below). He has left a lasting and significant impact in several areas, not only amphipod systematics, but also subterranean biodiversity, biogeography, and conservation.

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A native of Virginia's Shenandoah Valley, John began going into caves in the 1950's when he was a student at Virginia Polytechnic Institute and State University (now Virginia Tech). After his graduation from VPI in 1955 and a stint in the Army signal corps in Hawaii, he taught high school biology in Fairfax County, Virginia, and started the Biological Survey of Virginia Caves, an NSS supported project. During the late 1950's and early 1960's John was an active vertical caver. Together with his longtime friend and colleague John Cooper, they not only made the first biological collections in many vertical caves in the Virginias, but also helped lead the exploration and survey of these same caves. His speleological career began as an avid caver.

John Holsinger's interest in cave organisms was crystallized by his research for a Master of Science thesis, awarded in 1963 from Madison College (now James Madison University.) Much of his thesis was published in the *NSS Bulletin* in the form of a checklist of the obligate cave-dwelling organisms found in Virginia caves (1). He developed an interest in the overall diversity of cave life, which continued throughout his scientific career. It is reflected in papers and articles not only about amphipods (see below) but also on bats (2), salamanders (35,124), isopods (9,10,20,24,44,52,56,86) and mites (4,5). He pioneered the idea that overall biological surveys of cave faunas were important, and co-authored annotated lists for Georgia (17), Pennsylvania (31), east Tennessee (67), West Virginia (32), and two monograph length updates of the Virginia cave fauna (67, 133), first in 1988 and again in 2013. And he encouraged others to produce lists as well. This seemingly simple lists, often underappreciated, made it possible, in later years, for John and others to make generalizations and maps of subterranean biodiversity hotspots.

After extensive caving in the Virginias during the late 1950's and early 1960's, and with growing interest in subterranean biodiversity, John returned to graduate school at the University of Kentucky, where he obtained his Ph.D. in 1967 under the direction of Thomas C. Barr, a prominent biospeleologist. John's dissertation was on the taxonomy of a group of subterranean amphipods in the genus *Stygonectes* (7,8) which he eventually classified in the genus *Stygobromus*. The genus now has about 140 described species, the vast majority of which were described by John (12,28,38,40,60,65,96,121,123,127,134, 135). John described hundreds of species, not only in the genus *Stygobromus*, but in all of the other 8 amphipod genera that occur in North American caves, including the speciose genus *Crangonyx* (98, 103). John documented that *Stygobromus*, all of which are eyeless, occurred in a variety of subterranean habitats, not just caves. These included deep interstitial habitats, the hyporheic of streams, epikarst, and the hypotelminorheic. While European biospeleologists were well acquainted with non-cave subterranean habitats, Americans were not, and John brought this extra dimension to North American studies. As the years went on, his interest in subterranean amphipods became global, and he described dozens of new species from throughout the world. These included species of *Crangonyx* and *Stygobromus* from outside North America (42,123,130), and the cave and interstitial species in the families Bogidiellidae (89,90,91,108,111,113) and Hadziidae (27,53,57,61, 74,78,79,87,97,99,100,102,105). His enthusiasm for the morphology of cave amphipods was boundless. Anyone who was fortunate enough to hear him give a presentation on subterranean amphipods was treated to an enthusiastic and interesting talk, even if John

had already described many similar species. In lusiess skilled hands, his talks would have become soporific.

His studies of subterranean amphipods on a global basis led John in two new directions. One was a study of the biogeography of subterranean amphipods and the likely scenarios of colonization and dispersal (55,66,70,75,88,104,129) and he introduced the two-step model of colonization of freshwater subterranean habitats from marine habitats (92). John always remained flexible with respect to the various schools of biogeography and systematics, using and testing components of each (76). His work on biogeography of subterranean amphipods is among the most cited of his publications, with several papers being cited more than 100 times (55,66).

The second direction his studies of subterranean amphipods on a global level was a strong commitment to international cooperation and collaboration. He started attending meeting outside the U.S. in the 1970's at a time well before globalization and well before a time when international cooperation was the norm. This is all the more remarkable for someone who grew up in a small town in the southern United States. The first international meeting John attended was "International Colloquium on *Gammarus* and *Niphargus*" in Schlitz, Germany in 1975. It was at this meeting that he forged friendships and collaborations with a multitude of biospeleogists from throughout the world, including Magniez (France), Ruffo (Italy), Siderov (Russia), Skalski (Poland) Sket (Slovenia), and Straškraba (Czech Republic). In 1978, together with Arthur Buikema, he organized an "International Symposium on Groundwater Ecology" in Blacksburg, Virginia, and provided Americans with their first opportunity to meet their international colleagues. John was a mainstay of the International Society for Subterranean Biology, attending most of the biennial meetings up to the meeting in Košice, Slovakia in 2012. He always treated his colleagues, not just with dignity and respect, but with enthusiasm and genuine appreciation of their work

Although John never thought of himself as an isopod taxonomist, he authored or co-authored eight papers on isopods and described several new species (9,10,20,24,44,52,56,86). He also made significant contributions to our understanding of the ecology and natural history of subterranean organisms, especially with respect to amphipods (6,14,33,44,49,80,122).

John was a lifelong teacher. A high school biology and earth science teacher in the early days, he went on to be a professor at East Tennessee State University and Old Dominion University, where he spent most of his professorial career. He mentored a number of graduate students both at the Masters and PhD levels, including Ph.D. students Jill Yager, discoverer of the Remipedes, a previously unknown class of Crustacea; Lynn Ferguson, expert on cave adapted diplurans of North America; Jun Zhang, expert on *Crangonyx* amphipods; Stefan Koenneman, expert on Bogidiellid and Crangonyctid amphipods; Tom Sawicki, expert on *Hadzioidea* amphipods; and Julian Lewis, the leading expert on freshwater isopods of North America. John enlightened hundreds of Old Dominion University students over the decades through his unique course on Cave Biology, leading weekend long field trips to caves in Virginia and West Virginia to see some of the fascinating places and creatures covered in his lectures. He was a teacher to almost everyone he met, and had a singular ability to impart knowledge without condescension or arrogance. All of us learned a lot from him.

I am not sure if John had one favorite cave, but a good candidate would be Unthanks Cave in Lee County, an 12 km long cave with an abundant and diverse fauna. John was instrumental in persuading The Nature Conservancy to purchase the land above the entrance. The Virginia state Natural Heritage Program and The Nature Conservancy continue working together to protect all of the land overlying or draining to the cave. John Holsinger's conservation efforts extended far beyond protecting a handful of his favorite caves. John was part of a group of pioneers who saw a role for the state in the recognition and protection of cave and karst resources. Starting with the Commission on Virginia Caves and culminating with the Virginia Cave Board, John served thirty years as a governor appointed citizen volunteer working to protect the state's karst. Notable achievements of these boards included the passage of the Virginia Cave Protection Act in 1979, regulation of scientific studies to limit impacts to caves, recognition of the paleontological, archaeological, and associated cultural significance of caves, and direct actions to conserve and restore threatened and degraded cave systems. John's efforts led to the 1982 listing of the Madison Cave isopod (*Antrolana lira*) as threatened under the endangered species act as part of a successful attempt to prevent discharge of chlorinated water to a sinkhole overlying the species' type locality. In the 1980s John led the Cave Board campaign to restore and protect Lee County's Thompson Cedar Cave, which he discovered had been contaminated by leachate flowing from massive sawdust piles adjacent to and overlying the cave. The impact was so severe that almost all life in the cave had been extinguished, resulting in the Endangered Species listing in 1992 of the Lee County Cave isopod (*Lirceus usdagalun)*. The protection and resources afforded these two species have resulted in increased knowledge and long term protections not only of these animals, but the caves and groundwater in which they live. Early on, John recognized the threats human activity posed to caves and cave fauna (6) and actively sought their protection, even when he was a very lonely voice calling for protection. It is not an overstatement that his actions have brought species like *Lirceus usdagalun* back from the brink of extinction.

John still somehow managed to make time for Linda, his wife of four decades, and their extended family, who together with us mourn his passing and celebrate his life. Linda was his mainstay and devoted caregiver in his later years. In honor of John's work toward our understanding of caves, cave biology, conservation and taxonomy, the Virginia Natural Heritage Program established the John R. Holsinger Cave Conservation Fund. Those wishing to contribute should contact the Virginia Department of Conservation and Recreation Division of Natural Heritage at 804-786-7951. Checks can be sent c/o John R. Holsinger Cave Conservation Fund, 600 East Main Street, 16th floor, Richmond, Virginia, 23219.

In all his activities, John Holsinger was incredibly generous in sharing both time and credit. He always welcomed new people to caving and cave biology. He could also be irascible, and it is fair to say he did not suffer fools gladly. Setting an example which we all would do well to follow, John took the time to carefully document and publish nearly everything he did, leaving a lasting contribution to both the caving and broader scientific communities. In a real sense, he devoted his life to speleology, which will be much diminished by his passing.

I wish to thank Chris Hobson and Wil Orndorff of the Virginia Department of Conservation and Recreation for help in tracking down details of John's remarkable life.

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